NON-PUBLIC?: N
ACCESSION #: 9302040203
LICENSEE EVENT REPORT (LER)

FACILITY NAME: Seabrook Station PAGE: 1 OF 7

DOCKET NUMBER: 05000443

TITLE: Manual Reactor Trip Due To Loss of Feedwater
EVENT DATE: 1/3/93 LER #: 93-001-00 REPORT DATE: 2/2/93

OTHER FACILITIES INVOLVED: DOCKET NO: 05000

OPERATING MODE: 1 POWER LEVEL: 100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR SECTION:
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:
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Compliance Mngr. x3772

COMPONENT FAILURE DESCRIPTION:
CAUSE: SYSTEM: COMPONENT: MANUFACTURER:
REPORTABLE NPRDS:

SUPPLEMENTAL REPORT EXPECTED: No

ABSTRACT:

On January 3, 1993 at 0350 a manual reactor trip was initiated from 100% power. The reactor was manually tripped after both main feedwater pumps (MFP) SJ! shutdown due to low suction pressure. This event was reported to the NRC pursuant to 10CFR50.72(b)(2)(ii) as an automatic actuation of the Reactor Protection System and Engineered Safety Feature (ESF) System.

On January 2, 1993 a failure of the tube side relief valve SN! for the 25A condensate (CO) heater SJ! required isolation of the heater. Subsequent condensate (CO) and feedwater (FW) level oscillations caused the 21/22 CO heater strings to isolate and the heater bypass valve to open. An incorrect restoration of the 21/22 CO heater strings isolated CO flow to the MFPs which caused both pumps to shutdown due to low suction pressure. With no main feedwater flow to the steam generators, the reactor was manually tripped.

The plant response to the trip was normal and no unexpected transients were observed. The primary root cause of the event was incomplete communications and a secondary root cause was lack of procedural guidance.

Immediate corrective action was to walkdown the CO and FW systems and to review the event with the oncoming operating crews. The 25A tube side relief valve was repaired during the power ascension. To prevent recurrence, Operations Management will continue to emphasize the importance of clear, explicit communications and will develop a procedure to respond to heater drain system transients.

END OF ABSTRACT

On January 3, 1993 at 0350 a manual reactor trip was initiated from 100% power. The reactor was manually tripped after both main feedwater pumps (MFP) SJ! shutdown due to low suction pressure. This event was reported to the NRC pursuant to 10CFR50.72(b)(2)(ii) as an automatic actuation of the Reactor Protection System and Engineered Safety Feature (ESF) System.

Background Information

On January 2, 1993 a failure of the tube side relief valve for the 25A condensate (CO) heater SD! required isolation of the heater. The shell side outlet from the 26A feedwater (FW) heater SJ! cascades to the 25A CO heater to provide additional FW heating. During this time, Operations personnel maintained the unit at 100% rated thermal power since this was consistent with normal operating procedures and practices in response to this type of transient. With the 25A CO heater isolated, the 26A FW heater discharges directly into the Heater Drain Tank (HDT) SN! via the 26A FW heater hi level dump valve (Figure 1). This valve responds slowly to level fluctuations but is capable of maintaining adequate shell side water level. A subsequent level oscillation in the 26A FW heater reached the hi-hi level isolation setpoint and caused the heater to isolate. This reduced the flow into the heater drain tank. The heater drain tank pump discharge valves throttled closed in response to a decreasing heater drain tank level causing a decreased CO system pressure and a corresponding increase in CO pump flow.

Increased CO flow through the 21/22 CO heater strings caused increased condensation in the shell side of the heaters. A drop in shell side pressure resulted, causing shell side water levels to rise. When shell side water level reached the hi-hi level setpoint the inlet and outlet valves for the 21/22C CO heater string closed and the bypass valve opened

(Figure 2). Heater drain pump discharge flow continued to decrease and the standby CO pump automatically started. To restore flow through the 21/22C CO heater string, the inlet, outlet, and bypass valves must be repositioned from a local control panel (CP-66). Upon being informed by the Unit Shift Supervisor (USS) that there was a 21C heater hi-hi level isolation and given direction to unisolate the feedwater heater string and close the bypass valve, an auxiliary operator (AO) opened the inlet isolation valve and closed the bypass valve, but failed to open the outlet isolation valve. Following this, the AO contacted the Control Room and stated that the feedwater heater string was unisolated and the bypass valve closed. Note that during this time the Control Room was monitoring feedpump suction pressure with indication that parameters were normal. Since the outlet isolation valve remained closed, there was no CO flow through the 21/22C CO heater string, and as a result, CO flow increased which caused shell side condensation to increase in both the 21/22A and B CO heater strings. When the 21A CO heater subsequently reached its hi-hi level isolation setpoint, the inlet and outlet isolation valves closed and the bypass valve opened. After having been directed by the Control Room to unisolate the feedwater heater string and close the bypass valve, the AO opened the inlet isolation valve, closed the bypass valve but failed to open the outlet isolation valve. Following this, the AO contacted the Control Room and stated that feedwater heater string was unisolated and the bypass valve closed. This left all CO flow passing through the 21/22B CO heater string. When the 21B CO heater reached the hi-hi level isolation the inlet and discharge valves closed and the bypass valve opened.

Similarly, after having received direction from the Control Room to unisolate the feedwater heater string and close the bypass valve, the AO opened the inlet isolation valve and closed the bypass valve, but failed to open the outlet isolation valve, These actions collectively resulted in no CO flow through any of the 21/22 CO heaters and left the heater drain pumps as the sole supply of water to the suction of the MFPS. This resulted in a low suction pressure trip of first the A MFP and then 23 seconds later the B MFP. With no feedwater flow to the steam generators the reactor was manually tripped before the low-low steam generator reactor trip setpoint was reached.

Safety Consequences

There were no adverse safety consequences as a result of the event. Operator response to the manual reactor trip was appropriate to ensure the safety of the plant. At no time during the event was there any adverse impact on the health and safety of plant employees or the public.

Root Cause

The primary root cause of this event was incomplete communication. Specifically, the communications between the Control Room and the AO were not explicit enough in either direction to ensure proper equipment operation. The AO was directed to unisolate the heater string, without specific instructions about which valves were to be manipulated. The Control Room also did not verify that the AO understood the specific actions that would be required. Upon completion of the manipulations, the AO did not specify which valves had been operated, nor confirm that the Control Room understood his message.

A secondary root cause has been determined to be lack of procedural guidance in that there is no Abnormal Operating Procedure available for feedwater or heater drain system transients. The availability of such a procedure may have prompted the Control Room to give exact instructions to the AO which may have resulted in the proper restoration of the heater strings.

Contributing Factors

During the event there were communication difficulties between the Control Room and field. Specifically, the Control Room was unable to contact other AOs to assist with the transient. Previous successful recovery from this type of transient was accomplished with more than one AO.

Local control panel, CP-66, which controls the 21/22 CO heater valves has no mimics depicting the process flowpaths. In addition, some of the valve labels are unclear. The panel is simply a large control panel with many control switches on it. A mimic and clearer valve labels may have helped the AO realize that two isolation valves were required for heater restoration.

An additional contributing factor has been identified as the inadequate response of the 26A FW heater hi level dump valve. The slow response of this valve in response to a level oscillation was a precursor to event.

Corrective Action

Immediate corrective action was to walkdown the CO and FW systems and to review the event with all operating crews. The relief valve was repaired during the power ascension. These items have been completed. Actions to prevent recurrence are:

1. Operations management will continue to implement their enhanced communications program and re-emphasize the crucial importance of clear and explicit communications. Operations management has previously recognized the requirement and necessity to enhance communications techniques throughout the Operations Department. Based on this, numerous programs have been ongoing at Seabrook Station to promote good communications. These include the Operations Good Practice on communications, which delineates proper communication protocol between the operating crews. Additionally, the Operations Manager provided ongoing guidance to the operating crews on appropriate communications. Furthermore, the AOs are currently receiving additional exposure to proper communications during simulator training and training within the Control Room, that is being presented to the AOs as part of AO Continuing Training.

2. The Operations Department will develop an Abnormal Operating Procedure which will address operator response to secondary plant transients, particularly to a loss of condensate or feedwater heating and any heater drain induced transients. This item is scheduled to be completed by March 1, 1993.

3. The Operations Department has begun using vibrating beepers to contact AOs in the field. The use of these beepers should minimize future problems in contacting personnel in the field.

4. An operator aid was provided at CP-66 for the 21/22 CO heater valves to highlight the 21/22 CO heater inlet, outlet, and bypass valves.

5. The valve nameplates at CP-66 have been revised to more accurately reflect the function the valve.

6. The control logic for the 21/22 CO heater string bypass valve will be evaluated to determine if it can be modified so that the valve is prevented from closing when either a 21/22 heater string inlet or outlet valve is closed. The evaluation is scheduled to be completed by July 5, 1993.

7. The use of digital controls for the 26 FW heaters will be evaluated. The evaluation is scheduled to be completed by September 1, 1993.

Previous Occurrences

Seabrook Station has experienced several occurrences of secondary plant transients caused by level oscillations in the CO and FW heating systems.

The station has an ongoing program of replacing older pneumatic valve controllers with new digital controllers.

The digital controllers significantly improve the response of the associated valve.

This is the second time that incomplete communications has contributed to a reactor trip during a feedwater or steam generator level transient. The previous event was reported in LER 92-17. As described in Corrective Action #1, operations management has an ongoing program to emphasize the crucial importance of clear and explicit communications.

At the time of the event the plant was in Mode 1 at 100% power.

Figure 1 "Heater Drains Overview" omitted.

Figure 2 "Condensate System Overview" omitted.

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NYN-93019

February 2, 1993

United States Nuclear Regulatory Commission
Washington, D.C. 20555

Attention: Document Control Desk

Reference: Facility Operating License No. NPF-86, Docket No. 50-443

Subject: Licensee Event Report (LER) 93-01-00: Manual Reactor Trip Due to Loss of Feedwater

Gentlemen:

Enclosed please find Licensee Event Report (LER) No. 93-01-00 for Seabrook Station. This submittal documents a Reactor Trip and Engineered Safety Feature actuation which occurred on January 3, 1993. This event is being reported pursuant to 10CFR50.73(a)(2)(iv). This event was previously reported by North Atlantic as a nonemergency four hour report, pursuant to 10CFR50.72(b)(2)(ii), on January 3, 1993.

Should you require further information regarding this matter, please contact Mr. James M. Peschel, Regulatory Compliance Manager at (603) 474-9521 extension 3772.

Very truly yours,

Ted C. Feigenbaum

TCF:MDO/act

a member of the Northeast Utilities system

ATTACHMENT 1 TO 9302040203 PAGE 2 OF 2

United States Nuclear Regulatory Commission February 2, 1993
Attention: Document Control Desk Page two

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